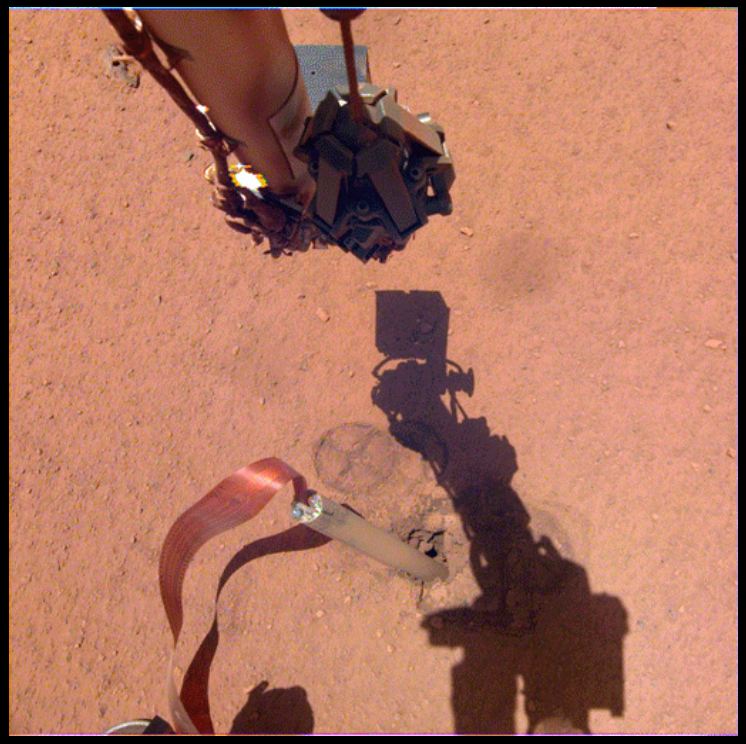
Mars Exploration Program Analysis Group (MEPAG)



The shadow of NASA InSight's robotic arm moves over its heat probe, or "mole," on Nov. 3, 2019, the 333rd Martian day, or sol, of the mission.

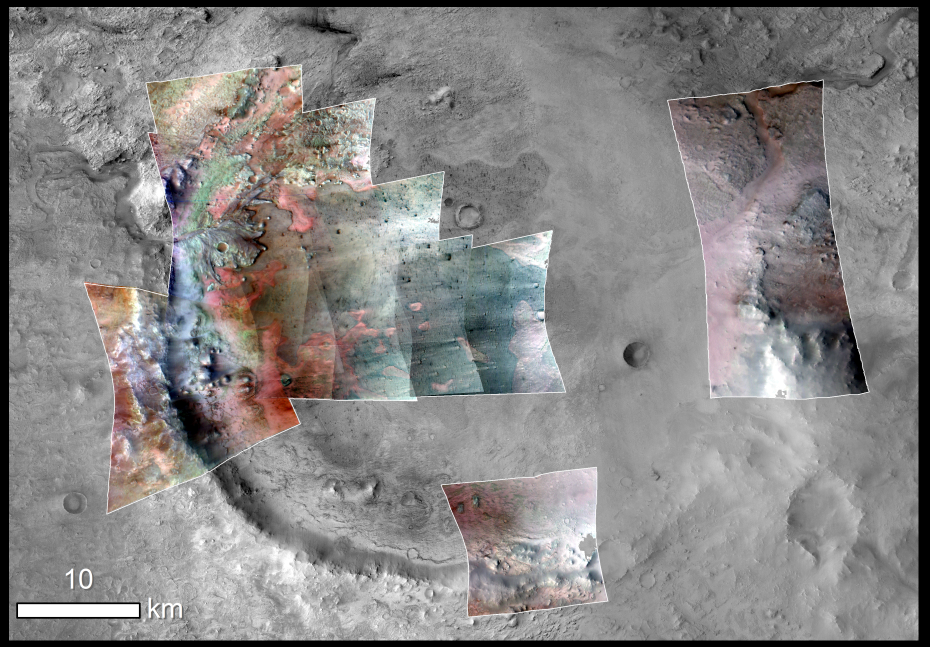
R. Aileen Yingst, *MEPAG Chair*

Report to Planetary Science Advisory Committee

6 December 2019

Outline

- MEPAG programmatics
- Recent activities and meetings
- Future work
  - MEPAG Goals update
  - Preparations for the next Planetary Decadal Survey
- Summary



Color has been added to highlight minerals in this image of Jezero Crater on Mars, the landing site for NASA's Mars 2020 mission. The green color represents minerals called carbonates, which are especially good at preserving fossilized life on Earth. Red represents olivine sand eroding out of carbonate-containing rocks. The image was created using data taken by NASA's Mars Reconnaissance Orbiter and its Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) and Context Camera (CTX).

MEPAG Programmatics

- Committees:
  - Executive Committee (Chair: R. Aileen Yingst (PSI), appointed 6/19)
    - W. Calvin (Univ. Nevada Reno)
    - J. Eigenbrode (GSFC)
    - D. Banfield (Cornell)
    - B. Cohen (GSFC)
    - J. Filiberto (LPI)
    - S. Hubbard (Stanford University)
    - J. Johnson (former Chair, JHU/APL) Ex Officio
    - M. Meyer (NASA HQ)
    - D. Beaty, R. Zurek (JPL)
    - J. Bleacher/P. Niles (HEOMD, NASA HQ) Ex Officio members
  - Goals Committee (D. Banfield, Chair)
    - Goal I <*Life*> (S.S. Johnson, Georgetown University; J. Stern, GSFC; A. Davila, NASA Ames)
    - Goal II <*Climate*> (R. Wordsworth, Harvard University; D. Brain (Univ. Colorado)
    - Goal III <*Geology*> (B. Horgan, Purdue' Becky Williams, PSI)
    - Goal IV <*Human Exploration*> (J. Bleacher, GSFC; Paul Niles, JSC; M. Rucker, JSC)

Recent MEPAG Activities

- MEPAG meetings (https://mepag.jpl.nasa.gov/meetings.cfm)
  - **MEPAG #37 Face-to-Face Meeting (July 26, 2019; Pasadena, CA; post-9th Mars): ~200 attendees, 50+ log-ons**
    - Decadal Survey preparations, Goals document update preparations, Mars mission reports, HEO/Commercial space, Mars program architecture discussion. Findings finalized Sept. 5, 2019, https://mepag.jpl.nasa.gov/meetings.cfm
  - **MEPAG VM #6 (August, 2019): ~104 attendees**
    - Discussion of Planetary Protection Independent Review Board (PPIRB) request for input, New Frontiers program discussion.
    - Findings posted at https://mepag.jpl.nasa.gov/meetings.cfm
  - **MEPAG VM #7 (November, 2019): ~110 attendees**
    - Discussion of Planetary Protection Independent Review Board (PPIRB) report, New Frontiers program discussion, concerns about extended missions.
    - Findings and summary posted at https://mepag.jpl.nasa.gov/meetings.cfm

Mars Exploration Program Analysis Group (MEPAG)

Virtual Meeting #7 Summary

- Report from Mars Program (Michael Meyer)
  - M2020 on schedule for launch, with no further budget cuts to other missions/programs planned (barring continuing resolution budget woes)
  - M2020 PS likely posted in December, new MSL PS posted early 2020
  - Michael Meyer (MEP) and Jeff Grossman (CAPTEM) are discussing collaboration on MSR
- Two Mars Concepts (MORIE, PI: W. Calvin; MOSAIC, PI: R. Lillis) awarded Planetary Mission Concept funding.
- Mars Architecture Strategic Working Group (MASWG) report (Bruce Jakosky)
  - MASWG will consider the possible elements and policies of a Mars Exploration Program future architecture; expects to provide a PPT summary of findings at the next in-person MEPAG meeting and then a full report delivered to NASA before summer.
  - As part of its deliberations, MASWG seeks to understand the types of mission concepts feasible in the period 2020-2035, launched in parallel with or following Mars Sample Return; Chair Jakosky asked the MEPAG community for 1-page mission concepts before Nov. 22; 53 were submitted.
- Report on the Chinese Space Program (Jim Head)
  - The Chinese Space Program has plans for a Mars Mission (launching in July 2020) which includes an orbiter, lander, and rover component.
- • Report from the Planetary Protection Independent Review Board (PPIRB; presented by Amanda Hendrix; https://www.nasa.gov/sites/default/files/atoms/files/planetary_protection_board_report_20191018.pdf). Recommendations included:
  - More frequently review and update its Planetary Protection policies (at least twice a decade)
  - Consider re-categorizing much of the martian surface from Class IV to II.
  - Study transport and amplification to understand whether wind-transport of contamination materials could happen or already has happened.
- • Extant life Conference report (Brandi Carrier; November 5-8, 2019; https://www.hou.usra.edu/meetings/lifeonmars2019/)
  - A significant segment of the community is interested in searching for extant life on Mars, specifically in caves, salts, ice, and the deep subsurface.
  - Such a search would build on recent advances in our understanding of Mars geologic history, life in extreme environments, and detection methods.

Recent and Upcoming MEPAG Prep for Decadal Survey

- MEPAG Goals Document
  - Update from Oct. 2018 document will be based on ICE-SAG (Ice and Climate Evolution Science Analysis Group) report, on 9th Mars Conference synthesis reports, and community input
  - Goals document timeline — first draft to the community planned by beginning of January; community feedback in by end of January. Final report due for presentation and approval at face-to-face MEPAG meeting in April.
- Assist community in responding to the next Decadal Survey
  - Next MEPAG face-to-face meeting (tentatively April 15-17, 2020) — community discussion and collaboration on white papers and other topics of interest.
  - Provided googledocs form for those authors who wish to inform others about white paper topics of interest.
    - Prior to opening of the LPI site, 10 white paper concepts had been posted to the MEPAG googledocs space.
    - Lead authors are now directed to the recently opened LPI omnibus site. However, the MEPAG googledocs space will continue as a workspace for drafting work and adding co-authors.

Progress/Status on key MEPAG Concerns:

- Progress is being made toward Mars Sample Return (re: Finding 1, MEPAG #37):
  - M2020 is on track for launch in July 2020; hopefully, there will be no further budget impact on other missions and activities.
  - It is anticipated that the next flight elements required—the Sample Retrieval Lander (with Fetch Rover and Mars Ascent Vehicle) and the Earth Return Orbiter—will be authorized and funding will be committed in the next NASA and ESA budgets.
  - The MSR Science Planning Group (MSPG) continues to work issues related to handling samples returned from Mars.

- The lack of program definition for other priority Mars science (re: Finding 2, MEPAG #37) is being addressed:
  - NASA's commissioning of a MEP Mars architecture strategy working group (MASWG) to develop a comprehensive MEP architecture that addresses the Decadal Survey science goals is encouraging.
  - Innovative paths for non-MSR flight investigations (orbital or landed) should be identified, including possibilities with international partners (Re: Finding 4, MEPAG #37), commercial partners and smaller missions.

- Concerns regarding Extended Missions (re: Finding 5, MEPAG #37):
  - Projects have still not received final guidance, including confirmed budgets, based on the Senior Review findings.
  - Declining budgets and programmatic decisions continue to threaten the previous productivity of these missions (most of which received excellent or very good ratings in the 2019 PMSR). MEPAG encourages NASA to give due consideration to these missions, which continue to provide key data for improving our understanding of the complex planet that is Mars.

Conclusions

- Progress is being made on several MEPAG issues, including Mars Sample Return and the discussion of a program architecture to address non-MSR science priorities.
  - The commissioning of MASWG is encouraging. MEPAG is ready to assist where needed and looks forward to discussions of the group's findings and recommendations.
- Decadal Survey preparations continue:
  - The Goals document will be updated in time to inform the Decadal Survey.
  - Assisting the community with white paper generation will ramp up quickly once the decadal survey statement of task is negotiated between NASA and NASEM.
- New and ongoing discoveries challenge many previous views of Mars, including its potential for extant life; community momentum is strong to address these high-priority questions.